S/N 09/338,045
Docket: GB919980092US1

## REMARKS

Entry of this Amendment under 37 CFR §1.116 is proper since no new claims are added, no new issues are raised, and the arguments presented herein clarify issues for appeal.

Claims 31, 32, and 38-42 are all the claims pending in the present Application. Claims 31 and 32 are allowed. Applicant gratefully acknowledges the Examiner's indication that claim 41 would be allowable if rewritten in independent format. However, after reviewing the rejection currently of record, Applicant considers that the Examiner continues to fail to properly understand the present invention and declines to rewrite this claim in independent format at this time, since it is believed that all claims are allowable when properly understood.

It is noted that the claim amendments herein are intended solely to more particularly point out the present invention for the Examiner, and not for distinguishing over the prior art or the statutory requirements to patentability. Applicant again points out that the Examiner is seemingly still attempting to improperly read the "object data structure" of the present invention onto the objects of Houldsworth. No similar data structures exist in Houldsworth. Applicant has again attempted to clarify the claim language to more clearly describe the object structure of the present invention for the benefit of the Examiner.

It is further noted that, notwithstanding any claim amendments made herein, Applicant's intent is to encompass equivalents of all claim elements, even if amended herein or later during prosecution.

Claims 38-40 and 42 are rejected under 35 USC §103(a) as unpatentable over US Patent 6,314,436 to Houldsworth, further in view of "Uniprocessor Garbage Collection Techniques" by P.R. Wilson.

This rejection is traversed in view of the discussion below.

### I. THE CLAIMED INVENTION

As described and claimed herein, for example, by claim 38, the present invention is directed to a method of garbage collecting memory, the memory having objects that have

object pointer structures references in a thread stack. An object pointer structure from the thread stack is retrieved.

From the object pointer structure are extracted a reference to its corresponding object and a reference to a next object pointer structure in the thread stack. The retrieval and extraction is then performed for a next, subsequent and last object pointer structures. The thus retrieved object references identify a root set of objects within the memory. The memory not used by the root set of objects is then reclaimed.

The present invention, by incorporating a memory data structure having a built-in link component to the next memory data structure allows the active memory data structures to be positively identified very quickly, without conducting the scanning operation of conventional techniques, such as described in Houldsworth. Houldsworth does not teach or suggest this built-in link component in a memory object data structure.

## II. THE PRIOR ART REJECTION

The Examiner alleges that claims 38-40 and 42 are unpatentable over Houldsworth, further in view of Wilson. As best understood, the Examiner continues to improperly consider that the conventional tracing technique described in Houldsworth reads upon the wording of the claims.

Applicant respectfully disagrees, since it is submitted that one of ordinary skill in the art would clearly understand that the wording of Houldsworth does not at all describe a memory data structure that includes the linking reference components of the present invention.

That is, as best understood, the Examiner views the description "... a marking method for traversing data structures formed of data objects linked by identifying pointers in a contiguous memory..." at lines 19-22 of column 2 in Houldsworth as somehow similar to the data structure of the present invention. However, the "data structure" of Houldsworth is actually quite different from that of the present invention. Houldsworth does not teach or suggest that the "identifying pointers" are a component of the data objects themselves.

The "identifying pointers" in Houldsworth are clearly described at lines 16-39 of column 5 as involving a series of memory stacks that include pointers for memory objects in

the heap. However, unlike the present invention, these linking pointers are not components of the memory objects' data structure.

To one of ordinary skill in the art, this distinction is clearly described at lines 16-20 of column 5: "In conjunction with the heap 50, a number of discrete stored data structures are used. Physically, these may comprise separate entities or may be discrete areas within the memory containing the heap, but outside of the area scanned for garbage collection purposes."

In contrast to this description, one of ordinary skill in the art would clearly understand that the linking pointers of the present invention, since they contained within the memory objects themselves, therefore, would be inherently inside the area scanned for garbage collection.

Therefore, the present invention clearly differs from the tracing technique of Houldsworth and clearly patentable over the tracing technique described therein. Wilson does not overcome this basic deficiency of Houldsworth, nor could any reference be properly combined with Houldsworth to incorporate the data structure components of the present invention, since such modification would change the principle of operation described in Houldsworth.

Hence, turning to the clear language of the claims, there is no teaching or suggestion of " ... method of garbage collecting memory, said memory having objects, said objects having object pointer structures references in a thread stack, said method comprising: retrieving an object pointer structure from the thread stack; extracting, from the object pointer structure ...", as required by claim 38. Independent claim 40 has similar language.

For the reasons stated above, the claimed invention is fully patentable over the cited references.

Further, the other prior art of record has been reviewed, but it too, even in combination with Houldsworth or Wilson, fails to teach or suggest the claimed invention.

## III. FORMAL MATTERS AND CONCLUSION

In view of the foregoing, Applicant submits that claims 31, 32, and 38-42 all the claims presently pending in the application, are patentably distinct over the prior art of record

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and are in condition for allowance. The Examiner is respectfully requested to pass the above application to issue at the earliest possible time.

Should the Examiner find the application to be other than in condition for allowance, the Examiner is requested to contact the undersigned at the local telephone number listed below to discuss any other changes deemed necessary in a telephonic or personal interview. The Commissioner is hereby authorized to charge any deficiency in fees or to credit any overpayment in fees to Assigness's Deposit Account No. 50-0510.

Respectfully Submitted,

Date: 12/29/03

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CERTIFICATION OF TRANSMISSION

I certify that I transmitted via facsimile to (703) 872-9306 this Amendment under 37 CFR §1.116 to Examiner T. Pardo on December 29, 2003.

12/29/03

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